

SN 10/052,862Docket No. S-97,794In Response to Office Action dated February 25, 2004

## AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

## LISTING OF CLAIMS:

1. (currently amended) An apparatus for chemical sensing comprising:
  - (a) a waveguide sensor comprising a single mode waveguide and a selective thin film chemically bound upon at least some of said waveguide, said selective thin film comprising reagent capable of binding to chemical compounds;
  - (a) (b) a light source capable of producing a laser light beam having two frequencies which are orthogonal to each other in polarization, said light source positioned to direct said laser light into a waveguide, a laser for providing a laser light beam comprising a first mode comprising a first frequency of light and a second mode comprising a second frequency of light, the first mode and second mode being substantially collinear and substantially orthogonal in polarization to each other, said light source laser positioned to direct said laser light beam into a said waveguide;
  - (b) at least one thin film of host reagent attached to a surface of said waveguide;
  - (c) a polarizer positioned to receive light output of from said waveguide;
  - (d) a photodetector positioned to receive light output of from said polarizer; and
  - (e) a phase sensitive detector connected to said photodetector so as to receive signals from said polarizer.
2. An apparatus as recited in Claim 1 wherein said ~~light source laser~~ is a Zeeman laser.
3. (cancelled)

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4. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said light source is a laser diode ~~positioned to direct a beam of laser light into a polarized beam splitter and modulator.~~

5. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said waveguide ~~is a~~ sensor comprises a planar waveguide.

6. (currently amended) ~~An~~ The apparatus as recited in Claim 5 wherein said planar waveguide is a ribbed channel waveguide.

7. (currently amended) ~~An~~ The apparatus as recited in Claim 5 1 wherein said waveguide ~~sensor is ribbed with~~ comprises a plurality of channels.

8. (currently amended) An apparatus as recited in Claim 7 wherein said plurality of channels are serpentine channels.

9. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said waveguide ~~is comprised of~~ comprises a waveguide material ~~selected from the group of:~~ silicon, silicon nitride, quartz, zinc oxide, zirconium oxide, tin oxide, indium-tin oxide, lithium niobate, gallium arsenide ~~and or~~ titanium dioxide.

10. (currently amended) ~~An~~ The apparatus as recited in Claim 9 1 wherein said waveguide material ~~is~~ comprises silicon nitride.

11-21. (cancelled)

22. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said ~~host~~ reagent ~~is~~ comprises a cyclodextrin derivative.

23-27. (cancelled)

28. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said ~~host~~ reagent ~~is~~ comprises a calixarene.

29-31. (cancelled)

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32. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said selective thin film comprises a plurality of layers of host ~~said~~ ~~reagent layers is attached to said~~ ~~waveguide.~~

33. (currently amended) ~~An~~ The apparatus as recited in Claim 32 wherein said plurality of ~~host~~ reagent layers comprises a first layer of cyclodextrin derivative attached to said waveguide and at least one other layer of cyclodextrin derivative attached to said first layer of cyclodextrin derivative.

34. (currently amended) ~~An~~ The apparatus as recited in Claim 32 wherein said first layer of cyclodextrin derivative and said at least one other layer of cyclodextrin derivative are different cyclodextrin derivatives.

35. (cancelled)

36. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said ~~host~~ ~~reagent is in a layer from~~ selective thin film is about 2 nanometers to about 1 micron thick.

37. (currently amended) An apparatus as recited in Claim 1 further comprising a ~~layer of waveguide material coating~~ an oxide surface between said waveguide material and said ~~host~~ reagent.

38. (currently amended) ~~An~~ The apparatus as recited in Claim 37 wherein said ~~waveguide material coating~~ oxide surface is silicon oxide comprises silicon dioxide.

39. (cancelled)

40. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said photodetector is a photodiode or photomultiplier.

41. (currently amended) ~~An~~ The apparatus as recited in Claim 1 wherein said phase sensitive detector is a lock-in amplifier.

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42. (currently amended) ~~An~~ The apparatus as recited in Claim 1 further comprising a connection from said ~~light source~~ laser to said phase sensitive detector to transmit a reference signal.

43-44. (cancelled)

45. (currently amended) ~~An~~ The apparatus as recited in Claim 7 wherein at least one of said plurality of channels is not coated with said thin film of ~~host~~ reagent to provide a reference channel.

46-193. (cancelled)